

# THE SCIENCE NEWS-LETTER

*A Weekly Summary of Current Science*

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## SPEEDY TYPIST LIKELY TO BE A MAN

Men are more rapid typists than women. Men are slower typists than women. Dr. J. McKeen Cattell, president of the Psychological Corporation, New York, believes that these apparently contradictory statements are true, although the question cannot be definitely determined until sufficiently large groups of men and women have been examined and compared.

But the typist of exceptional speed would be more likely to be a man, Dr. Cattell says, for it has been demonstrated that men are more variable than women. Men are more frequently color blind than women, but the great colorists have been men as are the great performers on the piano and violin. This difference extends to the lower animals. The male bird or mammal is more brightly colored and variously ornamented and armed than the female.

What we need, Dr. Cattell adds, is more knowledge both concerning sex differences and concerning the conditions which make a man or a woman a good typist. We need to measure the performance of large groups, so that we can say that among all the typists in New York City, this particular one stands in the first tenth for speed, in the second tenth for accuracy, in the lowest tenth for intelligence. She is good as a typist, but can never be a stenographer or private secretary. Another girl may stand high in intelligence, but low in speed and accuracy. Tests can be used to determine whether she can or can not acquire speed and accuracy. What the psychologist wants to do is to predict. An ordinary examination tells what a student has learned; we now have, and hope to perfect, tests that will foretell what a person will be able to do.

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## MENTAL GRIT MAKES YOU BREAK THINGS

What makes the cook smash dishes, even when she is not angry, and what causes a factory hand to unintentionally damage production, has been puzzled out by experts of the National Institute of Industrial Psychology, of London.

Pieces of mental grit get into human machinery and play hob. A large amount of breakage is due to mental irritation which is largely a result of fatigue. The worker who is not tired has sufficient energy to use in checking his irritability; the worker who has been performing mechanical motions all day shows his boredom by crashing something to the floor.

Breakages become epidemic at times, the British experts have found. Where groups of workers are engaged in handling the same material, excitement, fluster, hurry, or

irritation in one section quickly spreads to another. Where there is a regular flow of material with rush periods it is found that both the excitement of the rush and the reaction of the slack time damage efficiency and incidentally damage the things that are being handled. By introducing a steady flow of material there is a noticeable rise in efficiency.

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READING REFERENCE- Drever, James. The psychology of industry. London, Methuen & Co., 1921. Warren, Howard Crosby. Elements of human psychology. Boston, Houghton Mifflin Co., 1922.

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### TANGLING UP THE TIME LINE

By Edwin E. Slosson.

Einstein's theory of relativity is like a magician's bag. There seems to be no end to the queer things that can be pulled out of it. The more it is studied the more paradoxical it appears.

The latest thing I have seen is the queerest, the idea that the future may get tangled up in the present or even in the past. It is all worked out mathematically in a book just translated from the German, Weyl's "Time-Space-Matter". Too mathematical for most of us but the point in plain language is this:

Here is a line representing the course of time extending from the dim past into the indefinite future.

Past                      I                      Future

The present is the point where I stand, looking both ways like Janus but not seeing any end in either direction. I am continually moving or being moved straight along the time road from left to right. Every instant I step from the past into the future. Every instant a bit of time is taken from the future and added to the past, though neither gets any smaller or larger since both are infinite. The past time and the future time are permanently separated by the moving present where I am and there seems no chance of the two kinds of time ever getting mixed up for they extend in opposite directions.

But wait - here's a disconcerting idea. If I roll up the paper I can make the future touch the past. I can overlap them. I can put A.D. into B.C. and what becomes of chronology then?

We are used to this curving of apparently straight lines in space ever since 1492 when men found that they were not living on a flat earth but on a sphere. If I travel straight east from this town I will eventually come back to it from the west. How far I will have to go depends upon where I live. If my home were on the equator, I should have to travel 25,000 miles to get to my starting point. If it were near one of the poles I could do this astonishing stunt in the course of a morning's walk.

Now, according to Einstein, the time line is like the space lines. The framework of the world is measured by four dimensions, three of space and one of time, namely the up-down, right-left, to-fro, past-future lines. But these are not rigidly fixed. They may be bent and distorted like a bird cage that has been twisted and crushed though every wire remains intact and connected to the other wires just the same.

Wherever there is a bit of matter, wherever there are electrical or magnetic forces, there the time and space lines are more or less distorted. Einstein, reason-

ing from this idea, saw that a ray of light from a star, passing close by a heavy body like the sun would not travel straight but would be bent a little out of its course. The eclipse of 1919 brought the first chance to test Einstein's idea and the Astronomer Royal of Great Britain went to Brazil and took a photograph of the shadowed sun and seven stars about it. And the seven stars seemed shoved out of their customary places just as if in the region around the sun the space and time were puckered up in the way Einstein said they were. When the eclipse of September 21, 1922, came, eight parties of astronomers were on the watch in Australia to see if the observations of three years before were confirmed.

We have not heard their verdict yet but if their photographs measure up according to Einstein formula we shall have to get accustomed to the idea that time - like the tariff - is a local issue; that time measurements like space measurements are relative, not absolute, and that we are not sure of the constancy of our standards of measure in either case. When two things happen in our presence we may be pretty sure which comes first. But if one event is here and another in Mars we cannot be sure about priority with any conceivable system of clocks and signals. What seems past from one standpoint may seem future from another for the time line may not run straight. Is your present condition in any way the result of your future actions? Can the light of a match be seen before the match is lit? Such a thing is conceivable in the generalized theory of relativity though, like most other conceivable things, it does not occur or is never known to occur in reality. But it is hard to get used to this strange new notion that the future may curl around in some sort of a circle and so come into the past.

Did I say "new"? It was a slip of the pen. For the idea is old. I open a volume of Egyptian antiquities and I see carved on a monument of the Pharaohs' a serpent with its tail in its mouth, the symbol of eternity, of which time is a segment. But what the Egyptians merely guessed at Einstein is putting to the proof.

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#### THE MYSTERY OF TEMPORARY STARS

By Isabel M. Lewis,  
of U.S. Naval Observatory.

Twenty years ago the outburst of a temporary star or nova was regarded as a rare occurrence. At the present time novas are being discovered on photographic plates taken at the Harvard College Observatory and at the southern branch of the observatory at Arequipa, Peru, at the rate of eight or ten a year.

If this represents the average frequency of the outbursts of novas among the stars in the past as well as in the present and if we conservatively estimate the age of the earth as one thousand million years, it is evident that since our planet came into existence something like eight or ten thousand million novas have appeared in the heavens. But this is considerably in excess of the estimated total number of luminous stars in the heavens. Thus it is reasonable to conclude that all the stars in the heavens, including our own sun, have passed at least once and possibly several times through the "temporary" stage.

Novas appear exclusively in the Milky Way or that belt of the heavens toward which the great majority of all the visible stars tend to crowd and in which appear also vast tracts of nebulosity, luminous and non-luminous. Though there is still considerable doubt regarding the origin of novas it is generally considered that they are produced by the encounter of a star with nebulosity drifting through space or with members of a meteoric swarm of considerable size. The examination of Harvard plates covering the same field of stars taken at intervals of days, months or years shows that the sudden increase of a star many hundred or even thousand-fold in bright-



ness during a few hours or days is preceded in some cases by peculiar fluctuations in the brightness of the star for a number of years. This was true of the brilliant nova of 1918, Nova Aquilae No. 3, which for a few days outshone all the stars in the heavens with the exception of Sirius.

The novae that have been discovered in the systematic search for these objects at the Harvard College Observatory that was instituted soon after the appearance of Nova Aquilae No. 3 were in general too faint even at the height of their outbursts to be visible to the naked eye. Under normal conditions preceding the outbursts they were usually either too faint to appear at all on the plates covering the region in which they later appeared or they were barely visible.

After the sudden outburst of a nova there is a more or less rapid return of the star to approximately its former brightness. Apparently it is chiefly the atmosphere of the star that is affected by the catastrophe. In practically every instance it has been noted that the star is wrapped for some time in nebulosity after its sudden outburst. It is probable that in the course of time this nebular envelope gradually fades away and the marked signs of great excitation in the atmosphere of the star as revealed by the spectroscope disappear as well.

There may be many stars in the heavens that have experienced such a celestial catastrophe and recovered from it. It is possible that some of the irregularly variable stars, the cause of whose peculiar behavior is unknown, are doomed to pass through the nova stage at some time in the near future. Though a star may recover to a great extent from the effects of such an outburst it is certain that a celestial catastrophe in which the intensity of the star's light increases many thousand-fold would bring about a complete destruction of life on its planetary worlds if such existed.

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#### HOW TO GET \$75 INSTEAD OF \$25 OUT OF \$100 SPENT FOR COAL

Between the right and wrong way to operate a heater in the home, there may be represented a difference of \$50 out of every \$100 spent for coal. The Fuel Division of the Engineering Department of the U. S. Navy claims that the inefficient operator gets only \$25 worth of heat when with a little care he might utilize \$75 worth.

Many householders spend \$40 out of a \$100 in creating draft and keeping a shallow fire when they need only spend \$15 if they regulate the drafts and fire properly.

Proper use of the draft dampers is the most important factor in making this saving. In most heaters and furnaces, there are four dampers; one in the ashpit door, one in the coaling door, a turn damper in the smoke pipe, and a check damper located at the back of the elbow of the smoke pipe.

The check damper is usually an opening in the flue pipe covered with a hinged lid. When the lid is closed, the full chimney draft is effective and the heat flies up the flue. When the lid is lifted, the chimney draws air from the room instead of drawing the gases out of the furnace. This damper and the turn damper in the smoke pipe, should be about three-quarters closed after the fire is burning well to get the most heat into the room.

The damper in the coaling door supplies air over the fire which is needed to burn

the gases rising from the fuel bed. When soft coal is burned a large volume of gases rises from the fuel bed after the coal is added. The damper in the coaling door must be opened enough to permit the entrance of the air necessary for burning these gases. After the smoky gases cease to rise from the freshly fired coal, the quantity of air supplied over the fuel bed can be reduced by partly closing this damper. In burning soft coal, it should be slightly open at all times. This is the most difficult damper to adjust because there is no way to tell the completeness of combustion.

The damper in the ashpit door regulates the flow of air through the fire, and the amount of air flowing through the fire determines the amount of coal that the furnace can burn in an hour. To control the rate of burning and so regulate the amount of heat, this damper and those to the chimney are adjusted.

To make the fire burn faster, close the check damper and open the ashpit damper; to make fire burn slower open the check damper and partly close the damper in the ashpit door. Some people open the coaling door to check the fire. Such a procedure is a fuel waster.

A shallow fire is also wasteful. The fire pot should be kept full, and the fuel bed should be shaken down only until a glow appears in the ashpit. Shaking the fire until live coals fall causes a loss of \$5 of every \$100 that you pay to get heat. Half of this can be saved. The ash-pit should be kept clean and the hot coals should not be allowed to bank up and burn out the grate.

One-tenth of the heat is lost on account of dirty flues. This can be reduced to only one-twentieth by proper attention to cleaning.

If furnace and pipes are covered with asbestos, loss from useless radiation can be reduced from \$20 to \$2.50 out of every \$100 spent for coal.

The idiosyncracies of individual furnaces are great and their firemen often think they know them, but they are not sufficient to warrant some of the fuel wasting methods which are tried on them.

#### OIL FOR BRITISH NAVY FROM BRITISH COAL

Great Britain could produce enough oil for its navy and merchant marine from home mined coal if the necessity arose. This was revealed by Dr. C. H. Lander of the Fuel Research Board at the recent meeting of the British Association for the Advancement of Science.

Production of oil from home resources is extremely important to Great Britain since an almost complete substitution of oil for coal has taken place in the navy and is being gradually followed by the merchant marine. Although coal, peat and shale can be made to yield liquid fuel, coal alone can be regarded as a possible source from which sufficient quantities could be produced by practical methods.

A ton of average bituminous coal will yield 14 gallons of fuel oil, or about 6 per cent by weight of the raw material used. For every 1,000,000 tons of oil produced 16,000,000 tons of coal will be used and will yield also some 11,000,000 tons of coke and 56,000,000,000 cubic feet of rich hydrocarbon gas, so that if a satisfactory low-temperature process of carbonization proves feasible the 35,000,000 tons of coal used annually for domestic purposes would produce some 2,400,000 tons of oil, more than the peace requirements of the navy, and leave an enormous amount of manufactured fuel which it would be necessary to induce domestic consumers to use in place of raw coal.

## MAY DEVELOP NEW FUEL BY CHEMICAL PROCESSES

A new fuel and other new products that may be manufactured by catalytic oxidation from low grade petroleum has been developed by Prof. J. H. James, of the Carnegie Institute of Technology. The methods have proved successful in the laboratory stage, and give promise of practicability on a commercial scale.

The properties of this new fuel which is obtained by partial oxidation of petroleum may cause it to be used industrially in kerosene engines or blended with gasoline for use in gasoline engines. Although it has a somewhat lower fuel value than ordinary kerosene it undergoes much better combustion in the internal combustion engine.

Cheap varnish gum, paint film substitutes, lubricants, and frothing oil in ore flotation mixtures may also be made from petroleum by this catalytic oxidation process.

The process works best on oils that have a lower market value than Pennsylvania petroleum. The presence of sulphur compounds and of unsaturated hydrocarbons is no drawback to the application of the process, as oils containing these bodies oxidize more readily. This makes the process applicable to many refining wastes that now find their way into the fuel oil tank,

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READING REFERENCE- Hoffman, J.D. How to prevent heat losses in small houses. Engineering and Contracting 57:611-12 Je. 28, 1922. New system burns heavy oil in small heating plant. Popular mechanics, 37:251 Feb., 1922. Thrift in the use of fuel. Good Housekeeping, 73:66-7. Dec. 1921.

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## FINDS EARLY MAN'S FIRELESS COOKER

The prehistoric bride in the Early Bronze Age could boil water without burning the wood and hide containers which her hunter husband furnished her. Miss Nina F. Layard, has discovered primitive cooking places at Buckenham Tofts Park, Norfolk, England.

Ancient kitchens, now being excavated by her, are marked by thousands of flints cracked by fire. These rocks were apparently used as heaters for boiling water in vessels which would not stand the fire. They are found a foot or two beneath the sod and invariably a few yards from a stream.

Either a wooden trough or a stretched hide was in all probability the utensil used. This was filled with water and then the red-hot flints were shoveled in. In this way, the water was soon brought to a boil.

The bones and teeth of oxen and horses found between the heaters and the stream show where the cooking took place while with these flint heaters implements were found which fix the time as being in the early Bronze age.

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READING REFERENCE- Mason, O.T. Woman's share in primitive culture. N.Y. D. Appleton & Co., 1894.

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The metal soldiers formerly manufactured in the Nuremberg, Germany, toy factories have been superseded by American Indians.

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## AUTO ROADS HURT BY COAL AND RAIL STRIKES

The coal and railroad strikes are now being felt on the motor and wagon roads of the country. Shortage of cars for construction and repair material is causing great damage to the highways of the country, says Thomas H. MacDonald, chief of the Bureau of Public Roads at Washington. The public loss promises to be considerable.

The fuel and transportation tie-up has thrown a heavier load upon the highways. While the use of the roads and consequent wear upon them increases, the up-keep of them has had to be curtailed. Inability to get road construction and maintenance material seriously endangers the roads, Mr. MacDonald says.

Over \$158,790,000 worth of building and repair work and the employment of 78,932 men throughout the country are affected by the priority shipment orders of the Inter-State Commerce Commission. In several states, this inability to get road material has completely tied up the road construction with consequent loss to the contractors. This loss will ultimately be passed along to the public.

Under heavy traffic a hole in the road will spread 30 feet in a day. Without repair material on hand to take the proverbial "stitch in time" the accelerated rate at which the damage proceeds is laying up a big bill for the people of the country.

It is impossible to say at this time just how greatly the acute road situation will be relieved by later ability to get railroad cars for hauling highway material.

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## LEAGUE HEALTH EXPERTS WATCH WORLD EPIDEMICS

The Health Section of the League of Nations is now issuing a weekly report on epidemics in progress in all parts of the world. It is believed that this report will prove extremely useful to the governments of the world in protecting themselves from invasion by disease from other countries.

Assistance from the International Health Board, an American organization supported by the Rockefeller Foundation, has assured the regular publication of this report.

The International Health Board is also aiding in establishing an interchange of public health personnel. It is planned to allow public health experts of all nations to study and serve in foreign lands in order that the lessons learned there may be applied at home.

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## AUSTRALIAN SCIENTIFIC CONFERENCE IN 1923

A scientific conference on problems relating primarily to the Pacific region will be held in Australia during August or September of next year. Plans are now being made for this event by the Australian National Research Council, supported by a Commonwealth grant of five thousand pounds under the leadership of Professor Sir T. Edgeworth David. This will be the second conference on Pacific problems. The first was organized by the Committee on Pacific Investigation of the American National Research Council and met in Honolulu in August, 1920.

The scientists and scientific agencies interested in studies of the Pacific have not yet formed any definite organization except a hold-over committee which has acted informally to facilitate continuity of effort. Although some form of organization may be adopted at the meeting in Australia, it is expected that each conference will be autonomous and independent and that the organization and program for each conference will be in the hands of the country that issues the invitation.

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## TRAINING, NOT EYES MAKES CRACK SHOTS

Ability to shoot straight does not depend on the color of the marksman's eyes or the shade of his hair. Old ideas that a blue-eyed rifleman is a better shot than his brown-eyed buddy are laid to rest by a study of thousands of soldiers made by Col. Weston P. Chamberlain and Maj. Albert G. Love, of the Army Medical Corps. They find that length of service is the most important factor in producing bulls-eye hits.

The proportion of blue eyes to brown eyes among soldiers of the different races and nativities qualifying in military marksmanship does not differ from that in the same groups of the general male population as represented in the Army during the World War.

Apparently the ability to qualify in the higher grades of military marksmanship decreases as keenness of eyesight diminishes. The only exception to this being among officers who may have worn glasses correcting refractive errors.

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## DO YOU KNOW THAT -

The deepest mine in the world is about 150 miles west of Rio de Janeiro, Brazil, and is a gold mine 6,426 feet deep.

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One third of the potential production of cotton in the United States was prevented by the boll-weevil in 1921.

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Carbon monoxide, the white damp which has caused the death of many miners, does not affect animals without red blood.

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Within the last twenty years the number of sheep in this country has decreased 43.7 per cent while the human population has steadily increased.

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## DO YOU KNOW THAT -

The Kimberly diamond mines are in old, extinct volcanoes.

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The per capita consumption of eggs in the United States is one-half an egg a day.

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In 1831 Faraday established the fact that it was possible to generate electricity by the expenditure of mechanical work, but it was nearly fifty years before the discovery was used with commercial success in the construction of the dynamo.

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The Carnegie Institution Magnetic Observatory at Watheroom, Western Australia, is the only one completely equipped in the southern hemisphere for investigations relating to the earth's magnetism, atmospheric electricity, and the earth's electric currents.

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Wheat, oats, barley, and rye are being grown successfully on Alaskan farms.

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